

532,387

Rec'd PCT/PTO 21 APR 2005

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
6 May 2004 (06.05.2004)

PCT

(10) International Publication Number
WO 2004/037416 A2

(51) International Patent Classification⁷: **B01J 31/00**

Avenida Rovisco Pais, 1049-001 Lisbon (PT). **PALAVRA, António F.**, [PT/PT]; IST, Centro de Química Estrutural, Complexo I, Avenida Rovisco Pais, 1049-001 Lisbon (PT).

(21) International Application Number:
PCT/PT2003/000015

(22) International Filing Date: 15 October 2003 (15.10.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
102859 23 October 2002 (23.10.2002) PT

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(71) Applicant (*for all designated States except US*): INSTITUTO SUPERIOR TÉCNICO [PT/PT]; GAL-TEC/GAPI, Avenida Rovisco Pais, 1049-001 Lisbon (PT).

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(72) Inventors; and

(75) Inventors/Applicants (*for US only*): **POMBEIRO, Armando**, [PT/PT]; IST, Centro de Química Estrutural, Complexo I, Avenida Rovisco Pais, 1049-001 Lisbon (PT). **FRAÚSTO DA SILVA, João** [PT/PT]; IST, Centro de Química Estrutural, Complexo I, Avenida Rovisco Pais, 1049-001 Lisbon (PT). **FUJIWARA, Yuzo** [JP/JP]; Department of Chemistry and Biochemistry, Graduate School of Engineering, Kyushu University, Fukuoka, Fukuoka 812-8581 (JP). **SILVA, José Armando**, [PT/PT]; IST, Centro de Química Estrutural, Complexo I, Avenida Rovisco Pais, 1049-001 Lisbon (PT). **REIS, Patrícia M.**, [PT/PT]; IST, Centro de Química Estrutural, Complexo I,

Declaration under Rule 4.17:

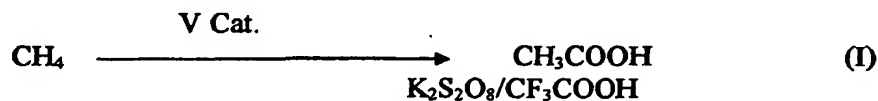
— as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations

Published:

— without international search report and to be republished upon receipt of that report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: CATALYSTS AND PROCESS FOR THE DIRECT CONVERSION OF METHANE INTO ACETIC ACID



(57) Abstract: The invention consists on the utilization of complexes of vanadium (in the +4 and +5 oxidation states) with bi- or poly-dentate ligands coordinated by nitrogen and oxygen (N,O) or by oxygen and oxygen (O,O) atoms, namely derivatives of aminoalcohols, (hydroxyimino)dicarboxylic acids, hydroxypyranones, trifluoroacetic acid, triflic acid or inorganic acid, as catalysts for the direct single-pot conversion, under mild conditions, of methane in acetic acid, either in the absence or in the presence of carbon monoxide, and in the presence of a peroxodisulfate salt (K₂S₂O₈), in trifluoroacetic acid (CF₃COOH), according to the general reaction (I).

WO 2004/037416 A2